The Joys of an Herb Garden at Home

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OVERVIEW

There are few things in life as good as your own herb, grown by yourself at home out in the garden and indoors in pots... Oregano, Dill, Basil, Sage and other herbs are all easy to grow. Mint will take over the whole yard if you let it. Fresh mint and celantro are incredible in salads and oriental dishes. But it all comes down to a truly motivational herb that is your friend and mine, a great healer and teacher to those that know it well. Most people think of gardens as a seasonal, yearly project, but it's actually less time consuming and more rewarding to keep the garden going year round. If one were to attempt to grow year round, indoor gardening techniques will be needed at least during winter to keep the garden producing. You will have herb fresh at all times, there is no worry of mass storage thru the winter and spring, it requires less space, and once established, requires only minimal attention every week to keep it

producing at optimal levels. The best part of being a gardener is it connects you to the earth. It connects you with nature, and is spiritually enriching. Try giving your plants energy by beaming good thoughts and energy at them every time you visit them. I find this helps me as much as it helps them; my plants seem to respond to it favorably.

GENETICS AND THE PLANT

It's very important to start with good genetics. You should attempt to find seeds from local gardeners that are acclimated and bred for local climate and best floral characteristics. Potency, aroma, fast growth, early maturation, resistance to fungus and pests. All of these factors are considered by the seasoned gardener and you will benefit enormously by finding a friend to get you started on the journey that never ends... Attempt to find an Indica/Sativa hybrid if possible, as this will have the best high and good characteristics for indoor growth as well. Indica plants have a heavy, stony high that is tiresome, and sativas' are hard to grow indoors due to high light requirements, and late flowering traits, so a hybrid can be bread that will have the energetic, cerebral high of the sativa and the early maturation tendencies of the Indica plant. The Indica plant is easily recognized by its extremely broad leaves that are very rounded on the sides. The Sativa has very narrow, finger-like leaves. A hybrid will have qualities of both and have leaves that are a cross of these two types, thinner than an Indica, but much broader than a Sativa. It is possible to recognize a good hybrid by the leaves once you know what to look for. Look for seeds that are dark brown or light grey. Some may have dark lines inset into these colors, like tiger stripes. White, small seeds are immature and should not be planted.

INDOORS & OUTDOORS - CONSTANT HARVEST STRATEGY

One of the best solutions to energy verses output for most home gardeners is to use outdoor light for flowering and use continuous light indoors for germination and vegetative growth. This will take advantage of the natural light/dark cycle and cut your energy use in half compared to the same operation indoors. A small greenhouse can be built of Filon fiberglass or PVC sheets that is innocuous and looks much like a storage shed or tool shed so it's not likely to raise suspicions. In fact, a large shed of metal or plywood can be modified with a luminous roof of PVC, glass, fiberglass or plastic sheet, and some strains that do not require a great deal of light will grow well. Such a shed will discourage fly-by sightings and keep your business your own! It also allows you to keep out rats and gophers, keeps out the neighbor kids, and can be easily locked up. It will also give you an opportunity to actually plant in the ground if you desire, and this is the best way to avoid root-bound plants (if your not using hydroponics), and get bigger harvests. In winter, indoor space is used to start new seedlings or cuttings to be placed outside in the spring, using natural sunlight to ripen the plants. This routine will provide at least 3 outdoor/greenhouse harvests per year. If more space is available to constantly be starting indoors and flowering 2nd harvest plants outdoors, harvests are possible every 60 days in many areas, with a small indoor harvest in the winter as a possibility as well. The basic strategy of year round production is to understand the plant has two growth cycles. At germination the plant enters into a vegetative state and will be able to use all the continuous light you can give it. This means there is no dark cycle required. The plant will photosynthesis constantly and grow faster than it would outdoors with long evenings. Photosynthesis stops during dark periods and the plant uses sugars produced to build during the evening. This is not a requirement and the plant will grow faster at this stage with continuous photosynthesis (constant light). Once the plant is 12-18" tall, weather permitting, it can be forced to start flowering by placing it outside in the Spring or Fall. (For Summer outdoor flowering, the night must be artificially lengthened in the greenhouse to "force" the plants to flower. See FLOWERING chapter.) Moving the plants to 10-13 hour light periods (moving it outside) with uninterrupted darkness (no bright lights nearby) will force the plant to flower. It will ripen and be 2-3' when ready to harvest. When a plant is moved from continuous indoor light to a 10-13 hour day outside, it will start to flower in anticipation of oncoming winter. Vegetative starts moved outside March 1st, will be ripe by May 1. Vegetative starts moved outside on May 1 will be ripe by July 1. Starts moved outside Sept 1 are picked by Nov. 1st. In Winter, operations are moved indoors and a crop is planted for seed in anticipation of planting outdoors the next summer, or just for some extra winter stash. Keep in mind that the "man" is looking for plants in the Sept./Oct./Nov. time-frame, and may never notice plants placed outside to flower in April. Be smart, make your big harvest in May, not October!

PLANTING INDOORS

A small indoor space should be found that can be used to germinate seeds; these vegetative starts are placed outside to mature in the spring after last freezes are over. The space can be a closet, a section of a bedroom, a basement area, an attic or unused bathroom. Some people devote entire bedrooms to growing. The space must be light leak proofed, so that no suspicious light is seen from outside the house. This could invite fuzz or rip-offs. The space should be vented. Opening the door of a closet can be enough ventilation if the space is not lit by big lights that generate a lot of heat. Separate exhaust and incoming air vents are best. One at the top of the room to exhaust air into the attic or out the roof, and one to bring in air from an outside wall or under-floor crawl space. Use fans from old computer cabinets, available from electronic liquidators for $5 each. Dimmer swithes can be used to regulate the speed/noise of the fans. Use silicon to secure the fans to 4-6" PVC pipe pushed thru a round hole cut in the floor and ceilings. Use lots of silicon to damp the fans vibrations, so that the walls do not resonate to the fans' ocsilations. Line the walls with aluminum foil, dull side out to diffuse the light and prevent hot-spots, or paint the walls bright white to reflect light. Aluminized mylar, 1 mil thick is best.($20 for 25 feet of a 4' wide roll.) Mirrors are not good to use, since the glass eats light! Line the floor with plastic in case of water spills, etc. Set up a voltage interrupt socket and be sure the electrical wiring will handle the lamps your going to use. Always place ballasts for HID lamps on a shelf, so they are above floor level, in case of water spills. Spacers place on the floor under a ballast will work too. A shelf above the main grow area can be used to clone cuttings and germinate seedlings. It will allow you to double the area of your grow space and is an invaluable storage area for plant food, spray bottles and other gardening supplies. This area stays very warm, and no germination warming pad will be needed, so this arrangement saves you $. Hang a light proof curtain to separate this shelf from the main area when used for flowering. This will allow constant lights on the shelf and dark periods in the main grow area. Velcro can be used to keep the curtain in place and ties can be used to roll it up when tending the garden. Black vinyl with white backing works best. Now you need light. A couple of shop lights will be fine if you just want to start plants inside and then take them outside to grow in a small greenhouse. They can be purchased with bulbs for about $10 each, or without bulbs for around $8. Try to find them on sale. Use one Cool White and one Warm Light type bulb in each to get the best light spectrum possible for plant growth. Do not use expensive Grow Lux type bulbs, as they do not put out as much light, and therefor do not work as well in most situations (go figure). If Cool White is all you can find, or afford, use them. They work fine, and are by far the cheapest.(About $1-2 each.)

SHELF GROWING

Shelf gardening with fluorescents may be the trend of the future, since the materials are so inexpensive, and easy to obtain. Fluorescent lamps are great for shelf gardening. In this system, many shelves can be placed, one above the other, and fluorescent lamps are used on each shelf. Some shelves have 24 hour lighting, some have 12 hour lighting (for flowering). Two areas are best, perhaps with one other devoted to cloning and germination of seed. Shelf gardening assumes your going to keep all plants 3' or shorter at maturity, so all shelves are 3-4 feet apart. Less light is necessary when you have plants that are this short and forced to mature early. One drawback to a shelf garden like this is that it is very time consuming to adjust the lamp height every day, and it is harder to take a vacation for even a week with no tending of the garden. This applies mostly to the vegetative stage, when plants are growing as much as an inch per day. Lamps on the flowering shelves are not adjusted nearly as often. Normally, the lamps should be kept within 2 inches of the tops of the plants, with the plants arranged such that they get progressively taller as the end of the lamps go up, so that all plants are within this 2" range. This is an ideal however, and if you do go on vacation, adjust the lamps so that your sure the plants will not be able to grow up to the lamps within that length of time. If enough flourecents are used to completely saturate the shelf with light, the spacing issue will not create spindly plants. They will mearly grow a little slower if the lamps are not very close to them. An alternative is to use fluorescent lamps for cloning, germination and early seedling growth on the top shelf of a closet, then switch over to HPS for heavy vegatative growth and/or flowering in the main closet area. Position the HPS such that it won't need adjustment, at the top most possible point in the closet or room. Most HPS installations will not require lamp height adjustment. Just attach the lamp to the underside of shelf or ceiling as high as possible, and if you want to get a few plants closer to it, put them on a temporary shelf, box or table to get them closer to the lamp. A shelf is all that is

necessary with this type of setup, preferably at least 18" wide, up to about 24" maximum. This area must be painted a very bright white, or covered with aluminum foil, dull side out to reflect light back to the plants. (Dull side out prevents hot-spots; diffuses light better.) Paint the shelf white too. Or, use aluminized mylar, a space blanket, or any silvery surface material. Do not use mirrors, as the glass soaks up light. Hang shop lamps from chains and make sure you can adjust them with hooks or some other type of mechanism so they can be kept as close to the plants as possible at all times (1-2"). If the lamps are too far from the plants, the plants could grow long, spindly stems trying to reach the lamp, and will not produce as much bud at maturity. This is due to internode length being much longer. This is the length of stem between each set of leaves. If it is shorter, there can be more internodes, thus more branches, thus a plant that provides more buds in less space at harvest time. Shelf gardening is sometimes referred to as Sea of Green, because many plants are grown close together, creating a green canopy of tops that are grown and matured quickly, and the next crop is started and growing concurrently in a separate area of continuous light. Clones are raised in a constant light shelf, until they start to grow well vegetatively, then placed on a 12 hour per day shelf to flower.

LIGHT

Indoors, 2000 lumens per sq. ft. is about as low as you want to go indoors. If you get under this mark, plant growth will certainly not go as fast as possible, and internode/stem length will increase. Also, light distance to plants will be much more critical. Daily adjustments to the lamps will be necessary, meaning you get no vacations. 2500 lumens psf should be a good target, and 3000 is optimal if your going to inject or enrich CO2 levels (more on that later). High Intensity Discharge lamps are the best solution for most indoor growers. HID lamps come in 3 basic flavors: High Pressure Sodium (HPS), Metal Halide (MH) and Mercury Vapor. Metal Halide is an improved spectrum, higher intensity Mercury Vapor design. HPS is a yellowish sort of light, maybe a bit pink or orange. Same as some street lamps. HPS lamps can be used to grow a crop from start to finish. Tests show that the HPS crop will mature 1 week later than a similar crop under MH, but it will be a bigger yield, so it's better to wait the extra week. The easiest HID to buy, and least expensive initially are the flourescent and mercury vapor lamps. MV will put out about 8000 lumens per 175 watts, and 150 watts of HPS puts out about 15k lumens, so HPS is almost twice as efficient. But the color spectrum from MV lamp output is not as good. HPS is high in reds, which works well for flowering, while the Metal Halide is rich in blues, needed for the best vegetative growth. Unfortunately, MV lamps provide the worst spectrum for plant growth, but are very inexpensive to purchase.They are not recommended, unless you find them free, and even then, the electricity/efficiency issues outweigh the initial costs saved. 400 watt HPS will output around 45k lumens. For every 500 watts of continuous use, you use about $20 a month in electricity, so it is evident that a lamp taking half the power to output the same lumens (or twice the lumens at the same power level) will pay for itself in a year or so, and from then on, continuous savings will be reaped. This is a simple initial cost vs. operating costs calculation, and does not take into account the faster growth and increased yield the HPS lamp will give you, due to more light being available. If this is factored into the calculation the HPS lamp will pay for itself with the first crop, when compared to MV or fluorescent lamps, since it is easily twice as efficient and grows flowers faster and bigger.

Lamp Type	Watts	Lumens per bulb	Total efficiency
Fluorescent Bulb	40	3000	400 watts = 30k lumens
Mercury Vapor	175	8000	400 watts = 20k lumens
Metal Halide	400	36000	400 watts = 36k lumens
High P. Sodium	400	45000	400 watts = 45k lumens

Notice the Mercury Vapor lamps are less efficient than the fluorescent (FL), and can not be positioned as close to the plants, so the plants will not be able to use as much of the MV light. The light distribution is not as good either. MV lamps simply are not suitable for indoor gardening. Use flourecent, MH, or HPS lamps only. Halogen arc lamps generate too much heat and not very much light for the wattage they use, and are also not recommened, even though the light spectrum is suitable for decent growth. There is a new type of HPS lamp called Son Agro, and it is available in a 250, 1000, and 400 watt range. The 400 is actually 430 watts; they have added 30 watts of blue to this bulb. It is a very bright lamp (53k lumens) and

is made for greenhouse use. These bulbs can be purchased to replace normal HPS bulbs, so they are an option if you already own a HPS lamp. The beauty of this bulb is that you do not give up most of the advantages of MH lamps, such as minimal internode spacing and early maturation, like most HPS users do, and you have all advantages of a HPS lamp. One bulb does it all. Internodal length of plants grown with the Son Agro are the shortest ever seen with any type of lamp. Plants grown under this lamp are incredibly bushy, compact and grow very fast. Son Agro bulbs however, do not last as long as normal HPS bulbs. There is something like a 25% difference in bulb life. Metal Halide (MH) is another option, and is available in both a 36k and 40k lumen bulbs for the 400 watt size. The Super Bulb (40k) is about $10-15 more, and provides an extra 4000 lumens. I think the Super Bulb may last longer; if so, that makes it the way to go. Halide light is more blue and better than straight HPS for vegetative growth, but is much less efficient than HPS. It is possible to purchase conversion bulbs for a MH lamp that convert it to HPS, but the cost of the conversion bulb is more expensive than the color corrected Son Agro bulb, so I would recommend just buying the Son Agro HPS. Even though it costs more initially, you get more for your energy dollar later, and it's much easier to hang than 10 fluorescent tubes. If you have a MH 36k lumen lamp burning at 400 watts and a 53k lumen HPS burning at 430 watts, which is better efficiency wise? Which will provide a better yield? Obviously, the Son Agro HPS, but of course, the initial cost is higher. Actually, the ballast will add about 10% to these wattage numbers. The Son Agro bulb will prove much better than the MH for any purpose. The MH bulb does not last as long, but is cheaper. Compare $36 for a 400 watt MH bulb vs. $40 for the HPS bulb. Add $15 for the Son Agro HPS. The HPS bulb life is twice as long. 10k hours vs. 21k hours. The Son Agro is 16k hours or so. Still, longer bulb life and more light add up to more for your energy dollar long term.

Horizontal mounting of any HID is a good idea, as this will boost by 30% the amount of light that actually reaches the plants. Most HID's sold for indoor garden use these days are of this horizontal mounting arrangement. HPS is much less expensive to operate than any other type of lamp, but comes in the 70 watt size at the home improvement stores. This size is not very efficient, but blows away FL in efficiency, so they might be an alternative to FL for very small operations, like 9 sq. feet or less. Over 9 sqr. feet, you need more light than one of these lamps can provide, but you could use two of them. 70 watt HPS lamps cost about $40 each, complete. Two lamps would be 140 watts putting out about 12k lumens, so it's better than FL, but a 150 watt HPS puts out about 18k lumens, the bulb life is longer, bulbs are cheaper and the lamp more efficient to operate. The biggest problem is that the mid size lamps like the 150 and 250 watt HPS are almost as expensive to buy as the larger 400's. For this reason, if you have room for the larger lamp, buy the 400. If your going pro, a 1080 watt model is available too, but you might find there is better light distribution from two 400's rather than one large lamp. Of course, the two smaller lamps are more expensive to purchase than one large lamp, so most people choose the larger lamp for bigger operations. Heat buildup in the room is a factor with HID lamps, and just how much light the plants can use is determined by temperature, CO2 levels, nutrient availability, PH, and other factors. Too big of a lamp for a space will make constant venting necessary, and then there is no way to enrich CO2, since it's getting blown out of the room right away. Bulb Costs: the bulb cost on the 70 watt HPS is $24, the 150 is only $30, and the 400 is only $40. So you will spend more to replace two 70 watt bulbs than you will to replace one 400 watt HPS. (Go figure.) Add that up with the lower resale value on the 70's (practically nothing) and the fact that they are being modified and are not suited to this application, and it becomes evident that $189 for a 250 HPS lamp, or $219 for a 400, might just be worth the price. Keep in mind that for $30 more, you can have the larger lamp (400watt) and it puts out 20k lumens more light than the smaller lamp. Not a bad deal! Here is the breakdown on prices (from memory):

Type	Watts		Complete Cost	Bulb Cost	Bulb Life	Lumens
HPS	400	$219	$40	18k hours	50k	
MH	400	$175	$37	10k hours	36k	
Son Agro	400	$235	$55	15k hours	53k	
Super MH	400	$190	$45	??	40k	
MH	250	$149	$32	??	21k	
HPS	250	$165	$36	??	27k	
HPS agro	250	$180	$53	??	30k	
MH	150	$139	$25	??	14k	

HPS	175	$150	$30	??	17k

If your looking for these types of lamps, look in the Yellow Pages under gardening, nursuries, and lighting for indoor gardening stores in your area.

SEA OF GREEN

Sea of Green (SOG) is the theory of harvesting lots of small plants, matured early to get the fastest production of buds available. Instead of growing a few plants for a longer period of time, in the same space many smaller plants are grown that mature faster and in less time. Thus, less time is required between crops. This is important to you when the electricity bill comes each month. One crop can be started while another is maturing, and a continuous harvest, year round can be maintained. 4 plants per square foot will be a good start for seedlings. 1 plant per square foot will allow plenty of room for each plant to grow a large top cola, but will not allow for much bottom branching. This is OK since indoors, these bottom branches are always shaded anyway, and will not grow very well unless given additional light and space. The indoor grower quickly realizes that plants that are too tall do not produce enough at the bottom to make the extra growing time used worth while. An exception to this rule would be if it is intended the plants are to go outside at some point, and it is expected that the light/shading issue will not be a factor at that point. The plants, if started at the same time, should create what is called a "green canopy" that traps most of the light at the top level of the plants. Little light will penetrate below this level, since the plants are so close together. The gardener is attempting to concentrate on the top of the plant, and use the light and space to the best advantage, in as little time as possible. Use of nylon poultry fence or similar trellising laid out over the green canopy will support the plants as they start to droop under the weight of heavy fruiting tops. Stakes can be used too, but are not as easy to install for plants in the middle and back of the room, where reach is more difficult. It's easy to want big plants, since they will produce more yield per plant, but it's usually better with limited space to grow smaller plants that mature faster and pack into smaller spaces. Sea of Green was developed in Holland. Instead of fitting 4 large plants in that small room, fit 12 small ones on a shelf above 12 other small plants. These plants take only 3-4 months to mature from germination to ripe buds, and harvesting takes place constantly, since there is both a vegetative and flowering area devoted to each, with harvests every 45-60 days. It's not the size of the plant, but the maturity and quality of the product that counts.

Twice as many plants grown half as big will fill the grow space twice as fast, so harvests take place almost twice as often. Get good at picking early flowering plants, and propagate only those that are of the best quality. 6" square containers will allow for 4 plants per square foot. You may also gauge by the size of your growing tray (for passive hydroponics); I like kitty litter boxes. ($3 each at Target) Planted 4 per square foot, (for vegatative seedlings) a 12 sq. ft. closet will hold 48 seedlings on one shelf. In my case, I use 4" rockwool cubes that fit into kitty litter pans @ 12 cubes per pan. I can get 5 pans onto a 12 sq. ft. closet upper shelf, so that is 60 seedlings on one small shelf! For flowering indoors, 1 plant per sq. ft. is a good rule of thumb for SOG. If less plants are grown in this size space, it will take them longer to fill the space, thus more electricity and time will be used to create the same amount of product. If more than one plant p.s.f. is attempted, the grower will soon find that plants thus crowded tend to be more stem than bud, and the total harvest may be reduced, so be cautious. It's good to avoid "topping" your plants if you want them to grow as fast as possible. It's better just to grow 2 or 4 times more plants, since they will produce more, faster, in the same space. Also, "training" plants with twist-ties is a great way to get them to bush out a bit. Just take any type of plastic or paper twist tie and wrap it around the top of the plant, then pull it over until the top is bent over 90-180 degrees and then attach this to the main stem lower on the plant. Do this for one week and then release the plant from it's bond. The plant can be trained in this fashion to take less vertical space and to grow bushier, to fill the grow space and force lower limbs to grow upward and join the green canopy. This technique takes advantage of the fact that if the top is pulled over, it creates a hormonal condition in the plant that makes it bush out at all lower internodes. Sea of Green entails growing to harvest the main cola (top) of the plant. Bottom branches are trimmed to increase air flow under the "blanket" of growing tops. Use these cuttings for clones, as they are the easiest part of the plant to root. It's also the fastest part of the plant to regenerate after flowering has occurred.

GERMINATION

Germinate seeds in sterile soil (for planting outdoors) or a hydroponic medium of rockwool or vermiculite. DO NOT (!) use a Jiffy cube #7 to germinate seeds. Informal tests and experience show these peat cubes do not work well and stunt the plants growth. Planting in vermiculite gives the seedling so much oxygen, and are so easy for roots to grow in, that the plants look large 1 week after germination! Keep them moist at all times, by placing seeds in vermiculite filled 16oz cups with holes in the bottom, placed in a tray of weak nutrient solution, high in P. Rockwool cubes also work extremely well. When the seed sprouts, place the rockwool cubes into larger rockwool cubes. No repotting or transplanting, and no soil mixing! You can germinate seeds in a paper towel. This method is tricky; it's easy to ruin roots if they dry out, or are planted too late after germinating. Paper towels dry out REAL FAST! Place paper towel in a bowl, saturated with weak nutrient solution (not too much!), and cover with plastic wrap to keep it from drying out. Put bowl in a warm area; top of the gas stove, water heater closet, or above warm lamps. Cover with black paper to keep out light. Check every 12 hours and plant germinated seeds with the grow tip up (if possible) in a growing medium as soon as the root coming out of the seed is 1/16" or longer. Use tweezers, and don't touch the root tip. Transplant as little as possible by germinating in the same container you intend to grow the plant in for a significant period of time. Just plant in vermiculite or rockwool. You will be amazed at the results! 90% germination is common with this method, as compared to 50% or less with Jiffy Cubes. (Your milage may vary.) 5-55-17 plant food such as Peter's Professional will stimulate root growth of the germinating seed and the new seedlings. Use a very dilute solution, in distilled water, about 1/3 normal strength, and keep temperatures between 72-80 degrees. Warm temperatures are very important. Many growers experience low germination rate if the temperatures are out of this range. A heating pad set to low or medium may be necessary, or a shelf constantly warmed by a light may do, but test it with a few seeds first, before devoting next years crop to it. No light is necessary and may slow germination. Cover germinating seeds with black paper to keep out light. Place seedlings in the light once they sprout. Plan on transplanting only once or twice before harvest. Use the biggest containers possible for the space and number of seedlings you plan to start. Plants will suffer if continuously transplanted and delay harvesting. You will suffer too, from too much work! 13 2-liter plastic soda bottles filled with vermiculite/pearlite will fit in a cat box tray, and will not require transplanting for the first harvest, if you intend to grow hydroponically. Transplant them for a second regenerated harvest. Cut holes in the bottom of containers and fill the last few inches at the top with vermiculite only, to start seeds or accept seedling transplants. Since vermiculite holds water well, wicks water well, but does not hold too much water, roots always have lots of oxygen, even if they are sitting in a tray full of water. A hydrogen peroxide based plant food is used to get extra oxygen to the plants when the pans are kept continuously full. The water can be allowed to recede each time after watering, before new solution is added. This allows the plants roots to dry somewhat, and make sure they are getting enough oxygen. Use SuperSoil brand potting soil, as it is excellent and sterilized. If you insist on using dirt from the yard, sterilize it in the microwave or oven until it gets steamy.(NOT RECOMMENDED) Sterilize the containers with a bleach solution, especially if they have been used a previous season for another plant.

VEGETATIVE GROWTH

Once sprouted, the plant starts vegetative growth. This means the plant will be photosynthesizing as much as possible to grow tall and start many grow tips at each pair of leaves. A grow tip is the part that can be cloned or propagated asexually. They are located at the top of the plant, and every major internode. If you "top" the plant, it then has two grow tips at the top. If you top each of these, you will have 4 grow tips at the top of the plant. (Since it takes time for the plant to heal and recover from the trauma of being pruned, it faster to grow 4 smaller plants and not top them at all. Or grow 2 plants, and "train" them to fill the same space. Most growers find) All plants have a vegetative stage where they are growing as fast as possible after the plant first germinates from seed. It is possible to grow plants with no dark period, and increase the speed at which they grow by 15-30&. Plants can be grown vegetatively indefinitely. It is up to the gardener to decide when to force the plant to flower. A plant can grow from 12" to 12' before being forced to flower, so there is a lot of latitude here for each gardener to manage the garden based on goals and space available. A solution of 20-20-20 with trace minerals is used for both hydroponic and soil gardening when growing continuously under lights. Miracle Grow Patio or RapidGrow plant food is good for this. A high P plant food such as Peter's 5-50-17 food is used for blooming and fruiting plants when

beginning 12 hour days. Epsom salts (1tsp) should be used in the solution for magnesium and sulfur minerals. Trace minerals are needed too, if your food does not include them. Miracle Grow Patio includes these trace elements, and is highly recommended. Keep lights on continuously for sprouts, since they require no darkness period like older plants. You will not need a timer unless you want to keep the lamps off during a certain time each day. Try to light the plants for 18 or more hours, or continuously at this point. Bend a young plant's stem back and forth to force it to be very thick and strong. Spindly stems can not support heavy flowering growth. An internal oscillating fan will reduce humidity on the leave's stomata and improve the stem strength as well. The importance of nternal air circulation can not be stressed enough. It will excersize the plants and make them grow stronger, while reducing many hazards that could ruin your crop.

HYDROPONIC VEGATATIVE SOLUTION, per gallon:

Miracle Grow Patio (contains trace elements) 1 teaspoon Epsom salts 1/2 teaspoon Human Urine (OPTIONAL - may create odors indoors.) 1/4 cup Oxygen Plus Plant Food (OPTIONAL) 1 teaspoon This mixture will insure your plants are getting all major and minor nutrients in solution, and will also be treating your plants with oxygen for good root growth, and potassium nitrate for good burning qualities. Another good GROWTH PHASE mix is 1/4 tsp Peter's 20/20/20 fertilizer per gallon of water, with trace elements and oxygen added, or fish emulsion. Fish emulsion is great in the grean-house or outdoors, where smells are not an issue, but is not recommended for indoors, due to its strong odor.

FLOWERING

The the plant will be induced to fruit or flower with dark cycles of 11-13 hours that simulate the oncoming winter in the fall as the days grow shorter. As a consequence, it works out well indoors to have two separate areas; one that is used for the initial vegetative state and one that is used for flowering and fruiting. There is no other requirement other than to keep the dark cycle for flowering very dark with no light interruptions, as this can stall flowering by days or weeks. Once a plant is big enough to mature (12" or over), dark periods are required for most plants to flower and bear fruit. This will require putting the lamp on a timer, to create regular and strict dark periods of uninterrupted light. In the greenhouse, the same effect can be created in the Summer (long days) by covering it with a blanket to make longer night periods. A strict schedule of covering the plants at 8pm and uncovering them at 8am for 2 weeks will start your plants to flowering. After the first 2 weeks, the schedule can be relaxed a little, but it will still be necessary to continue this routine for the plants to completely flower without reverting back to vegatative growth. Outdoors, Spring and Fall, the nights are sufficiently long to induce flowering at all times. Merely bring the plants from indoors to the outside at these times, and the plants will flower naturally. In late Summer, with Fall approaching, it may be necessary only to force flowering the first two weeks, then the rapidly lengthening nights will do the rest. Give flowering plants high P plant food and keep them on a strict light regimen of 12 hours, with no light, or no more than a full moon during the dark cycle. 13 hours light, 11 dark may increase flower size while still allowing the plant to go into the flowering mode. Use longer dark periods to speed maturity toward the end of the flowering cycle if speed is of the essence. (8-10 days) This will however, reduce total yield. Two shelves can be used, one identical to the other, if strictly indoor gardening is desired. One shelf's lights are set for 12-13 hours, and one is lit continuously. Plants are started in continuous light, and are moved to the other shelf to flower to maturity after several weeks. This flowering shelf should be bigger than the "starting" or "vegetative" shelf, so that it can accommodate larger plants. Or, some plants can be taken outside if there is not enough space on the flowering shelf for all of them near harvesting. A light tight curtain can be made from black vinyl, or other opaque material, with a reflective material on the other side to reflect light back to the plants. This curtain can be tied with cord when rolled up to work on the garden, and can be velcroed down in place to make sure no light leaks in or out. If the shelf is placed up high, it will not be very noticeable, and will fit in any room. Visitors will never notice it unless you point it out to them, since it is above eye level, and no light is being emitted from it. Flowering plants like very high P level foods, such as 5-50-17, but 10-20-10 should be adequate. Nutrients should be provided with each watering when first flowering. Trace elements are necessary too; try to find foods that include these, so you don't have to use a separate trace element food too. Home improvement centers sell trace element solutions rich in iron for lawn deficiencies, and these can be adapted for use in cultivating the herb. Prices for these mass produced fertilizers are significantly

cheaper than the specialized hydroponic fertilizers sold in indoor gardening shops, and seem to work just fine.

HYDROPONIC FLOWERING SOLUTION, per gallon:

1 tspn high P plant food, such as 15-30-15, or 5-50-17, etc. 1/2 tspn epsom salts 1 tspn Oxygen Plus Plant Food (Optional) 1 tspn Trace Element food

I cannot stress enough that during the FLOWERING PHASE, the dark period should not be violated by normal light. It delays flower development due to hormones in the plant that react to light. If you must work on the plants during this time, allow only as much light as a VERY pale moon can provide for less than 5 minutes. Keep pruning to a minimum during the entire FLOWERING PHASE. A green light can be used to work on the garden during the dark period with no negative reactions from the plants. These are sold as nursery safety lights, but any green bulb should be OK. It is best to keep the dark hours a time when you would normally not wish to visit the garden. Personally, I like my garden lit from 7pm to 7am, since it allows me to visit the garden at night after work and in the morning before work, and all day long, while I'm too busy to worry about it, it lies unlit and undisturbed, flowering away... Flowering plants should not be sprayed often as this will promote mold and rot. Keep humidity levels down indoors when flowering, as this is the most delicate time for the plants in this regard. Early flowering is noticed 1-2 weeks after turning back the lights to 12 hour days. Look for 2 white hairs emerging from a small bulbous area at every internode. This is the easiest way to verify females early on. You can not tell a male from a female by height, or bushiness. 3-6 weeks after turning back the lights, your plants will be covered with these white pistils emerging from every growtip on the plant. It will literally be covered with them. These are the mature flowers, as they continue to grow and cover the plant. Some plants will do this indefinately until the lights are turned back yet again. At the point you feel your ready to see the existing flowers become ripe (you feel the plant has enought flowers), turn the lights back to 8-10 hours. Now the plant will start to ripen quickely, and should be ready to harvest in 2-3 weeks. The alternative, is to allow the plant to ripen with whatever natural day length is available outside, or keep the plants on a constant 12 hour regimen for the entire flowering process, which may increase yield, but takes longer. Plants can be flowered in the final stages outdoors, even if the days are too long for normal flowering to occur. Once the plant has almost reached peak floral development, it is too far gone to revert quickly to vegatative growth, and final flowering will occur regardless. This will free up precious indoor space sooner, for the next batch of clones to be flowered. Look for the white hairs to turn red, orange or brown, and the false seed pods (you did pull the males, right?) to swell with resins. When most of the pistils have turned color (~80%), the flowers are ripe to harvest. Don't touch those buds! Touch only the large fan leaves if you want to inspect the buds, as the THC will come off on your fingers and reduce the overall yield if mishandled.

HYDROPONICS

Most growers report that a hydroponic system will grow plants faster than a soil medium, given the same genetics and environmental conditions. This may be due to closer attention and more control of nutrients, and more access to oxygen. The plants can breath easier, and therefor, take less time to grow. One report has it that plants started in soil matured after hydroponic plants started 2 weeks later! Fast growth allows for earlier maturation and shorter total growing time per crop. Also, with soil mixtures, plant growth tends to slow when the plants become root-bound. Hydroponics provides even, rapid growth with no pauses for transplant shock and eliminates the labor/materials of repotting if rockwool is used. (Highly recommended!) By far the easiest hydroponic systems to use are the wick and reservoir systems. These are referred to as Passive Hydroponic methods, because they require no water distribution system on an active scale (pump, drain, flow meter and path). The basis of these systems is that water will wick to where you want it if the medium and conditions are correct. The wick system is more involved than the reservoir system, since the wicks must be cut and placed in the pots, correct holes must be cut in the pots, and a spacer must be created to place the plants up above the water reservoir below. This can be as simple as two buckets, one fit inside the other, or a kiddie pool with bricks in it that the pots rest on, elevating them out of the nutrient solution. I find the wick setup to be more work than the reservoir system. Initial setup is a pain with wicks, and the plants sit higher in the room, taking up precious vertical space. The base the pot sits on may not be very stable compared to a reservoir system, and a knocked

over plant will never be the same as an untouched plant, due to stress and shock in recovery. The reservoir system needs only a good medium suited to the task, and a pan to sit a pot in. If rockwool slabs are used, a half slab of 12" rockwool fits perfectly into a kitty litter pan. The roots spread out in very desirable horizontal fashion and have a lot of room to grow. Plants grown in this manner are very robust because they get a great deal of oxygen at the roots. Plants grown with reservoir hydroponics grow at about the same rate as wicks or other active hydroponic methods, with much less effort required, since it is by far the simplest of hydroponic methods. Plants can be watered and feed by merely pouring solution into the reservoir every few days. The pans take up very little vertical space and are easy to handle and move around. In a traditional hydroponic method, pots are filled with lava/ vermiculite mix of 4 to 1. Dolite Lime is added, one Tblspn. per gallon of growing medium. This medium will wick and store water, but has excellent drainage and air storage capacity as well. It is however, not very resuable, as it is difficult to recapture and sterilize after harvest. Use small size lava, 3/8" pea size, and rinse the dust off it, over and over, until most of it is gone. Wet the vermiculite (dangerous dry, wear a mask) and mix into pots. Square pots hold more than round. Vermiculite will settle to bottom after repeated watering from the top, so only water from the top occasionally to leach any mineral deposits, and put more vermiculite on the top than the bottom. Punch holes in the bottom of the pots, and add water to the pan. It will be wicked up to the roots and the plants will have all they need to flourish.

The reservoir is filled with 1 1/2 - 3 inches of water and allowed to recede between waterings. When possible, use less solution and water more often, to pull more oxygen to the roots faster over time. If you go away on vacation, simply fill the reservoirs full to the top, and the plants will be watered for 2 weeks at least. One really great hydroponic medium is Oasis floral foam. Stick lots of holes into it to open it up a little, and start plants/clones in it, moving the cube of foam to rockwool later for larger growth stages. Many prefer floral foam, as it is inert, and adds no PH factors. It's expensive though, and tends to crumble easily. I'm also not sure it's very reusable, but it seems to be a popular item at the indoor gardening centers. Planting can be made easier with hydroponic mediums that require little setup such as rockwool. Rockwool cubes can be reused several times, and are premade to use for hydroponics. Some advantages of rockwool are that it is impossible to over water and there is no transplanting. Just place the plant's cube on top of a larger rockwool cube and enjoy your extra leisure time. Some find it best to save money by not buying rockwool and spending time planting in soil or hydroponic mediums such as vermiculite/lava mix. Pearlite is nice, since it is so light. Pearlite can be used instead of or in addition to lava, which must be rinsed and is much heavier. But rockwool has many advantages that are not appreciated until you spend hours repotting; take a second look. It is not very expensive, and it is reusable. It's more stable than floral foam, which crunches and powders easily. Rockwool holds 10 times more water than soil, yet is impossible to over-water, because it always retains a high percentage of air. Best of all, there is no transplanting; just place a starter cube into a rockwool grow cube, and when the plant gets very large, place that cube on a rockwool slab. Since rockwool is easily reused over and over, the cost is divided by 3 or 4 crops, and ends up costing no more than vermiculite and lava, which is much more difficult to reclaim, sterilize and reuse (repot) when compared to rockwool. Vermiculite is also very dangerous when dry, and ends up getting in the carpet and into the air when you touch it (even wet), since it drys on the fingers and becomes airborne. For this reason, I do not recommend vermiculite indoors. Rockwool's disadvantages are relatively few. It is alkaline PH, so you must use something in the nutrient solution to make it acidic (5.5) so that it brings the rockwool down from 7.7, to 6.5 (vinagar works great.) And it is irritating to the skin when dry, but is not a problem when wet. To pre-treat rockwool for planting, soak it in a solution of fish emulsion, trace mineral solution and phosphoresic acid (PH Down) for 24 hours, then rinse. This will decrease the need for PH worries later on, as it buffers the rockwool PH to be fairly neutural.

Hydroponics should be used indoors or in greenhouses to speed the growth of plants, so you have more bud in less time. Hydroponics allows you to water the plants daily, and this will speed growth. The main difference between hydroponics and soil growing is that the hydroponic soil or "medium"is made to hold moisture, but drain well, so that there are no over-watering problems associated with continuous watering. Also, hydroponically grown plants do not derive nutrients from soil, but from the solution used to water the plants. Hydroponics reduces worries about mineral buildup in soil, and lack of oxygen to suffocating roots, so leaching is usually not necessary with hydroponics. Hydroponics allows you to use smaller containers for the same given size plant, when compared to growing in soil. A 3/4 gallon pot can

easily take a small hydroponically grown plant to maturity. This would be difficult to do in soil, since nutrients are soon used up and roots become cut-off from oxygen as they become root-bound in soil. This problem does not seem to occure nearly as quickly for hydroponic plants, since the roots can still take up nutrients from the constant solution feedings, and the medium passes on oxygen much more redily when the roots become bound in the small container. Plant food is administered with most waterings, and allows the gardener to strictly control what nutrients are available to the plants at the different stages of plant growth. Watering can be automated to some degree with simple and cheap drip system apparatus, so take advantage of this when possible. Hydroponics will hasten growing time, so it takes less time to harvest after planting. It makes sense to use simple passive hydroponic techniques when possible. Hydroponics may not be desirable if your growing outdoors, unless you have a greenhouse. CAUTION: it is necessary keep close watch of plants to be sure they are never allowed to dry too much when growing hydroponically, or roots will be damaged. If you will not be able to tend to the garden every day, be sure the pans are filled enough to last until next time you return, or you can easily lose your crop. More traditional hydroponic methods (active) are not discussed here. I don't see any point in making it more diffucult than it needs to be. It is necessary to change the solution every month if your circulating it with a pump, but the reservoir system does away with this problem. Just rinse the medium once a month or so to prevent salts build up by watering from the top of the pot or rockwool cube with pure water. Change plant foods often to avoid deficiencies in the plants. I recommend using 2 different plant foods for each phase of growth, or 4 foods total, to lessen chances of any type of deficiency. Change the solution more often if you notice the PH is going down quickly (too acid). Due to cationic exchange, solution will tend to get too acid over time, and this will cause nutrients to become unavailable to the plants. Check PH of the medium every time you water to be sure no PH issues are occuring. Algae will tend to grow on the medium with higher humidities in hydroponics. It will turn a slab of rockwool dark green. To prevent this, use the plastic cover the rockwool came in to cover rockwool slab tops, with holes cut for the plants to stick out of it. It's easy to cut a packaged slab of rockwool into two pieces, then cut the end of the plastic off each piece. You now have two pieces of slab, each covered with plastic except on the very ends. Now cut 2 or 3 4" square holes in the top to place cubes on it, and place each piece in a clean litter pan. Now your ready to treat the rockwool as described above in anticipation of planting. If growing in pots, a layer of gravel at the top of a pot may help reduce algae growth, since it will dry very quickly. Algae is merely messy and unsightly; it will not actually cause any complications with the plants.

RECYCLING

Use pots made from squarish containers such as plastic water jugs, etc. More plants will fit in less space and have more rooting area if square containers are used. This makes your garden a recycling center, and saves you tons of money. 2-liter soda bottles work great, but are not square. 13 will fit in a kitty litter box, and these will take a 3 foot plant to maturity hydroponically. If you can get 4 litter boxes in a closet, you can grow 52 plants like this vegatatively. Spread them out more for flowering. Old buckets, plastic 3-5 gallon containers (food and paint industries, try painters' and resturant dumpsters), paper paint buckets, old plastic garbage cans of all sizes, and garbage bags have all been used successfully by growers. Do not use paper milk cartons and juice cartons for reservoir hydroponics, since these are difficult to sterilize, and they introduce fungus into your reservoir trays. Inert materials, such as plastic is best. Be sure to sterilize all containers before each planting with a clorine bleach solution of 2 tbspn. of bleach to one gallon of water. Let container and meduim such as rockwool soak for several hours in the solution before rinsing thouroghly.

PLANTING OUTDOORS

Outdoor growing is the best. Outdoor pot by far is the strongest, since it gets more light, it's naturally more robust. No light leak problems. No dark periods that keep you out of your grow room. No electricity bills. Sunlight tends to reach more of the plant, if your growing in the direct sun. Unlike growing indoors, the bottom of the plant will be almost as developed as the top. Outdoors, outside of a greenhouse, there are many factors that can kill your crop. Deer will try to eat them. Chipmonks and rodents too. Bugs will inhabit them, and the wind and rain can whip your little buds to pieces if they are exposed to strong storms. For this reason, indoor pot can be better than outdoor, but the best smoke I ever tasted was outdoor pot, so that tells you something; nothing beats the sun. Put up a fence and make sure it stays up.

Visit your plot at least once every two weeks, and preferably more often if water needs demand. It's a good idea to use soil if you don't have a green house, since hydroponics will be less reliable outside in the open air, due mostly to evaporation. Light exposure is all important when locating a site for a greenhouse or outdoor plot. A backyard grower will need to know where the sun shines for the longest period; privacy and other factors will enter in as well. Try to find an innocuous spot that gets full winter sun from mid morning to mid afternoon, at least from 10-4, preferably 8-5. This will be really asking for a lot if you live north of 30 degrees latitude since days are short in winter. Since most gardeners will not want to use the greenhouse in the middle of the winter, you can still use winter sun as an indicator of good spring and fall lighting exposures. Usually the south side of a hill gets the most sun. Also, large areas open to the sun on the north side of the property will get good southern exposures. East and West exposures can be good if they get the full morning/afternoon sun and mid-day sun as well. Some books say the plants respond better to morning-only sun, verses afternoon-only sun, so if you have to choose between the two, morning sun may be better. Disguise your greenhouse as a tool shed, or similar structure, by using only one wall and a roof of white opaqued plastic, PVC, Filon, or glass, and using a similar colored material for the rest of the shed, or painting it white or silvery, to look like metal. Try to make it appear as if it has always been there, with plants and trees that grow around it and mask it from view while allowing sun to reach it. Filon (corrugated fiberglass)or PVC plastic sheets can be used outside to cover young plants grown together in a garden. Buy the clear greenhouse sheets, and opaque them with white wash (made from lime) or epoxy resin tinted white or grey and painted on in a thin layer. This will pass more sun than white PVC or Filon, and still hide the plants. Epoxy resin coats will preserve the Filon for many more seasons than it would otherwise last. It will also allow you to disguise the shed as metal, if you paint the clear filon sheets with a thin layer of resin tinted light grey. Paint will work as well, but may not protect as much. Be careful to use only as much as needed, to reduce sun blockage to a minimum. Dig a big hole, don't depend on the plant to be able to penetrate the clay and rubble unless your sure of the quality of topsoil in the area. Grassy fields would have good top soil, but your back yard may not. This alone can make the difference between an average 5' tall plant, and a 10' monster by harvest time. Growing in the ground will always beat a pot, since the plant will never become root bound in the ground. Plants grown in the ground should grow much larger, but will need more space for each plant, so plan accordingly, you can't move them once they're in!

You may want to keep outdoor plants in pots so they can be easily moved. A big hole will allow the pot to be place in it, thus reducing the height of the plant, if fence level is an issue. Many growers find pots have saved a crop that had to be moved for some unexpected reason (repairman, appraiser, fire, etc.). It's always best to put a roof over your plants outdoors. When I was a lad, we had plants growing over the fence line in the back yard. We started to build a greenhouse roof for them, and a cop saw us hauling wood, thought we were stealing it (which we were not) and looked over the fence at us and our lovely plants. We were busted, because he saw them. If he had seen a shed roof instead, there would never have been a problem. Moral of the Story: build the roof BEFORE the plants are sticking over the fence! Or train them to stay well below it. Live and learn... When growing away from the house, in the wild, water is the biggest determining factor, after security. Water must be close by, or close to the soil surface, or you will have to pack water in. Water is heavy and this is very hard work. Try to find an area close to a source of water if possible, and keep a bucket nearby to carry water to your plot. A novel idea in this regard is to find high water in the mountains, at altitude, and then route it down to a lower spot close by. It is possible to create water presure in a hose this way, and route it to a drip system that feeds water to your plants continuously. Take a 5 gallon gas can, and punch small holes in it. Run a hose out of the main orifice and secure it somehow. Bury the can in a river or stream under rocks, so that it is hidden and submerged. Bury the hose coming out of it, and run it down hill to your garden area. A little engineering can save you a lot of work, and this rig can be used year after year.

GUERRILLA FARMING

Guerrilla farming refers to farming away from your own property, or in a remote location of your property where people seldom roam around. It is possible to find locations that for one reason or another are not easily accessible or are privately owned. Try to grow off your property, on adjacent property, so that if your plot is found, it will not be traceable back to you. If it's not on your property, nobody has witnessed you there, and there is no physical evidence of your presence (footprints, fingerprints, trails, hair, etc.), then it is virtually impossible to prosecute you for it, even if the cops think they know who it belongs to.

Never admit to growing, to anyone. Your best defence is that your just passing thru the area, and noticed something you decided to take a look at, or carry a fishing pole or binoculars and claim fishing or bird watching. Never tell anyone but a partner where the plants are located. Do not bring visitors to see them, unless it is harvest time, and the plants will be pulled the same or following day. Make sure your plants are out of sight. Take a different route to get to them if they are not in a secure part of your property, and cover the trail to make it look as if there is no trail. Make cut backs in the trail, so that people on the main trail will tend to miss the cut-back to the grow area. Don't park on the main road, always find a place to park that will not arouse suspicion by people that pass on the road. Have a safe house in the area if you are not planting close to home. Always have a good reason for being in the area and have the necessary items to make your claim believable. Briar and poison oak patches are perfect if you can cut through it. Poison Oak must be washed away before an allergic reaction takes place. Teknu is a special soap solution that will deactivate poison oak before it has time to create a reaction. Apply Teknu immediately after contact and take a shower 30 mins. later. Try to plant under trees, next to bushes and keep only a few plants in any one spot. Train or top the plants to grow sideways, or do something to prevent the classic christmas tree look of most plants left to grow untrained. Tying the top down to the ground will make the plants branches grow up toward the sun, and increase yield, given a long enough growing season. Plants can be grown under trees if the sun comes in at an angle and lights the area for several hours every day. Plants should get at least 5 hours of direct sun every day, and 5 more hours of indirect light. Use shoes that you can dispose of later and cover your foot prints. Use surgical gloves and leave no fingerprints on pots and other items that might ID you to the fuzz...in case your plot is discovered by passers by. Put up a fence, or the chipmonks, squirles and deer will nibble on your babies until there is nothing left. Green wire mesh and nylon chicken fencing net work great and can be wrapped around trees to create a strong barrier. Always check it and repair every visit you make to the garden. A barrier of fishing line, one at 18" and another at 3' will keep most deer away from your crop. Gopher Granola is available for areas such as the N. CA mountains, where wood rats and gophers will eat your crop if given any opportunity to do so. The best fence in the world will not keep rats away from your plants! Do not use soap to keep dear away, it will attract rats! (The fat in the soap is edible for them.) Put the poison grain in a feeder than only small rodents can enter, so that birds and deer can't eat it. Set out poison early, before actual planting. The rats must eat the grain for several days before it will have any effect on them. Ultimately, you may find it's easier to grow in a greenhouse shed in your own backyard rather than try to keep the rats from eating your outdoor plot. When growing away from the house, in the wild, water is the biggest determining factor, after security. The amount you can grow is directly proportional to the water available. If you must pack-in water, carry it in a backpack in case your seen in-route to your garden; you will appear to be merely a hiker, not a grower. Transporting vegatative starts to the growing area is a most tricky aspect of growing outdoors. Usually, you will want to start plant indoors, or outside in your garden, then transport them to the grow site once they are firmly established. It may be desirable to first detect and separate males from females so that no effort of transporting/transplanting/watering males is incurred. One suggestion is to use 3" rockwool cubes to start seedlings in, then put 20 of them in a litter pan, cover it with another pan, and transport this to the grow site. The cubes can be planted directly into soil. If spotted inroute to the grow area, burying a dead cat may be a good excuse for being in the area. Few people would demand to see the rotting corpse! One outdoor grower we know has given up on seeds. He has several strains he likes to clone, so he starts 200 clones in his closet, then transports them outdoors in boxes to the grow site. No males, no differentiation, no weeding, no germinating seeds, no genetic uncertainties, no crops grown for seed, no transporting/transplanting/watering plants your just going to pull up later, no pollination nightmares, no wasted effort!

SOIL GROWING

Use Super Soil brand in California, as this is the only known soil on the West Coast that is guaranteed to be good. Many other brands are mostly wood products and have very few nutrients, are too moist, etc. Add vermiculite, pearlite or sand to Super Soil to increase it's drainage and aeration. Organic gardeners use their own compost prepaired from a mixture of chicken, cow or other manure and household food waste, leaves, lawn clippings, dog hair and other waste products including urine, which is high in nitrogen. Dog hair is not recommended for guerilla gardeners planting off their property where police could find it. DNA tests could prove it was YOUR dog's hair! Use P4 water crystals in the soil to give the plants a few days worth of emergency water reserves. This substance swells up with water and holds it like a sponge,

so that roots will have a reserve if harsh drought makes constant watering necessary. Go real easy on this stuff though, it tends to sink to the bottom of the pot and suffocate bottom roots (new growth roots) and stunts the plant. Use in extreme moderation, let it swell up for at least an hour before mixing with other soil. Plant size in soil is directly related to pot size. If you want the plant to grow bigger, put it in a bigger pot. Usually, 1/2 gallon per foot of plant is sufficient. A six foot plant would require a minimum of a 3 gallon pot. Remember, square containers have more volume in a square space (like a closet). Planting in the ground is always preferable when growing in soil. The plants can then grow to any size, unlimited by pot size. Bat Guano, chicken manure, or worm castings can all be used to fertilize organically in soil. Manures can burn, so they should be composted with the soil first, before planting, over several weeks. Sea weed is available to provide a rich trace mineral source that breaks down slowly and constantly feeds the plants. If growing outdoors in available soil, look around for leaves and other natural sources of nitrogen and work them into the soil, along with some dolmite lime and composted organic fertilizer. Even small amounts of plant food such as Miracle Grow can be added to soil at this time. (Organic gardeners frown upon this practice, however. Toxic wastes are produced by commercial fertilizer production.) Mulch can be made from leaves and spread out over the garden area to hold in moisture and keep down weeds near the plants.

SECURITY

Its interesting that pot plants really do blend in with other plants to the point that they are unidentifiable by all but the most observant. I remember a relative of the family on a visit to Texas showed me his corn in the garden and I was standing 3' away from several pot plants before I recognized them for what they were. Plants started outdoors late in the season never get very big and never attract the least bit of attention when placed next to plants of similar or taller stature. Even tall plants grown among several trees will be almost invisible in their camouflage. Outdoors the object is to control access to an area, and not to arouse suspicion. Tuck them here and there, never in a recognizable pattern. Space them out, and fit them in to the existing landscape such that they get full sun, but they're hidden or blend in. Fence lines and groups of several together are best. Try to find strains that seem to match the surrounding plants. Feed nitrogen to your plants if they need to be greener to blend in. Some growers even use plastic red flowers, pinned to a plant, disguising it as a flower bush. Visit the plants at night on full moons, and if your visible to neighbors, appear to be pruning a tree, mowing the lawn, or doing something in the yard that makes you invisible. Dig a hole and put a potted plant in it. The plant's height will be reduced by at least a foot. Some growers top the plant when it is 12" high, and grow the 2 tops horizontally along a trellis. The plant will never be over 3 feet tall, and never arouses suspicion from neighbors. This type of plant can even be grown in your yard in full view. Many stories abound of having the neighbors over for a BBQ and nobody ever noticed the nice plants over by the fence...

PLANT FOOD AND NUTRIENTS

Plant foods have 3 main ingredients that will be the mainstay of the garden, Nitrogen, Phosphorus, and Potassium. These 3 ingredients are usually listed on the front label of the plant food in the order of N-P-K. A 20-20-20 plant food has a Nitrogen level of 20%. Secondary nutrients are Calcium, Sulphur and Magnesium. In trace quantities, boron, copper, molybenum, zink, iron, and manganese. Depending on stage of growth, different nutrients are needed at different times. For rooting and germination, levels of high P nutrients with less N/K are needed. Vegetative growth needs lots of N, and human urine is one of the better sources, (mix 8 ounces to 1 gallon water), although it is not a complete fertilizer unto itself. 20-20-20 with trace elements should do it; I like Miracle Grow Patio food. Watch for calcium, magnesium, sulfur and iron levels too. These are important. One tablespoon of dolomite or hydrated lime is used per gallon of growing medium when a hydroponic medium is first brought on-line, to provide nitrogen, calcium and magnesium. Epsom salts are used to enhance magnesium and sulphur levels in solution. Tobacco grown with potassium nitrate burns better. Plant foods with PN (P2N3) are foods such as Miracle Grow. This is an excellent fertilizer for vegetative growth, or through the flowering cycle as well. Consider however, potassium nitrate is also known as Salt Peter, and is used to make men have less sexual desire or impotent, such as in mental institutions. So if certain plants are destined for cooking, you might use Fish Emulsion or some other totally organic fertilizer on these plants, at least in the last weeks of flowering. Most hydroponic solutions should be in the range of 150-600 parts per million in disolved

solids. 300-400 ppm is optimum. It is possible to test your solution or soil with a electrical conductivity meter if your unsure of what your giving your plants. Keep in mind most disolved solids readings are usually on the low side, and actual nutrient levels are usually higher. It is possible with passive hydroponics, to get nutrient build-up over several feedings, to the point the medium is over saturated in nutrients. Just feed straight water now and again, until you notice the plants are not as green (slightly), then resume normal feeding. "Pumping" is when you use more waterings to make the plants grow faster. This is dangerous if you proceed in a reckless manner, due to potential over-watering problems. You must go slowly and watch the plants daily and even hourly at first to be sure your not over-watering the plants. Use weaker plant food mixtures than normal, maybe 25%, and be sure your leaching once a month and running straight water through the plants at least every other time you water. This applies mainly to plants grown in soil mediums. Use of light strength Oxygen Plus plant food (or Food Grade Hydrogen Peroxide) allows the roots to breath better and prevents problems with over-watering. Check soil to be sure there are no PH anomalies that might be due to Hydrogen Peroxide in the solution. (One experienced grower told me he would not use H2O2 (HP) due to possible PH problems. This should not be a problem if your checking PH and correcting for it in watering solutions.) Be sure your medium has good drainage. At this point, if your watering soil based plants once a week, you can water every 3-5 days instead if you plant them in a medium with better drainage. Pearlite or lava rock will greatly increase the drainage of the medium and make watering necessary more often. This will pump the plants; they will tend to grow faster because of the enhanced oxygen to the roots. Make sure the plant medium is almost dry before watering again, as the plant grows faster this way.

An alternative is to use a standard plant food mixture (stronger) once every 3 waterings. The nutrients are suspended in the medium and stored in the soil for later use. The nutrients are washed out by 2 straight waterings afterward and there is no salts build up in the soil. (Does not apply to hydroponics.) Stop all plant food 2 weeks before harvesting, so that the plants don't taste like plant food. (This applies to hydroponics as well.) WARNING: Do not over-fertilize. It will kill your plants. Always read the instructions for the fertilizer being used. Use 1/2 strength if adding to the water for all feedings in soil or hydroponics if you are unsure of what your plants can take. Build up slowly to higher concentrations of food over time. Novice soil growers tend to over-fertilize their plants. Mineral salts build up over time to higher levels of disolved solids. Use straight water for one feeding in hydroponics if it is believed the buildup is getting too great. Leach plants in pots every month. If your plants look REALLY green, withhold food for a while to be sure they are not being over-fed.

PH AND FERTILIZERS

PH can make or break your nutrient solution. 6.7-6.2 is best to ensure there is no nutrient lock-up occurring. Hydroponics requires the solution to be PH corrected for the medium before exposing to the plants. Phosphoresic acid can make the PH go down; lime or potash can take it up when it gets too acid. Buy a PH meter for $10 and use it in soil, water, and hydroponic medium to make sure your not going alkaline or acid over time. Most neutral mediums can use a little vinegar to make them just this side of 7 ph to 6.5 or so. Most fertilizers cause a ph change in the soil. Adding fertilizer to the soil almost always results in a more acidic ph. As time goes on, the amount of salts produced by the breakdown of fertilizers in the soil causes the soil to become increasingly acidic and eventually the concentration of these salts in the soil will stunt the plant and cause browning out of the foliage. Also, as the plant gets older its roots become less effective in bringing food to the leaves. To avoid the accumulation of these salts in your soil and to ensure that your plant is getting all of the food it needs you can begin leaf feeding your plant at the age of about 1.5 months. Dissolve the fertilizer in worm water and spray the mixture directly onto the foliage. The leaves absorb the fertilizer into their veins. If you want to continue to put fertilizer into the soil as well as leaf feeding, be sure not to overdose your plants.

FOLAIR FEEDING

Folair feeding seems to be one of the easiest ways of increasing yield, growth speed, and quality in a well vented space, with or without elevated CO2 levels. Just prepare a tea of worm castings, fish emulsion, bat guano, or most any other plant food right for the job and feed in vegetative and early flowering stages. It is not recommended for late flowering, or you will be eating the sprayed-on material later. Stop foliar

feeding 2-3 weeks before harvesting. Wash off the leaves with straight water every week to prevent clogging the stomata of the leaves. Feed daily or every other day. Best times of day to Foliar feed are 7-10Am and after 5 in the evening. This is because the stomata on the underside of the leaves are open then. Also, the best temperature is about 72 degrees, and over 80, they may not be open at all. So find the cooler part of the day if it's hot, and the warmer part of the day if it's cold out. You may need to spray at 2AM if that's the coolest time available. The sprayer used should atomize the solution to a very fine mist; find your best sprayer and use it for this. Make sure the PH is between 7 and 6. 2. Use baking soda to make the solution higher PH, and vinegar to make the solution lower PH. It's better to spray more often and use less, than to drench the plants infrequently. Use a wetting agent to prevent the water from beading up, and thereby burning the leaves as they act as small prisms.Make sure you don't spray a hot bulb; better yet, spray only when the bulb has cooled. Perhaps the best foliar feeding includes using seltzer water and plant food at the same time. This way, CO2 and nutrients are feed directly to the leaves in the same spray. Foliar feeding is recognized in most of the literature as being a good way to get nutrients to the plant later when nutrient lockup problems could start to reduce intake from the roots. WARNING!: It is important to wash leaves that are harvested before they are dried, if you intend to eat them, since they may have nitrate salts on them. NOTE: One grower who reviewed this document comments: "Fish emulsion smells. Bat guano could be highly unsanitary. Stick to the Rapid-Gro, MgSO4 (epsom salts), hydroponic trace element solution. Nitrate salts (The "N" in NPK) are unhealthy to smoke. Personally, I never foliar feed." Above is a great comment, and there is great wisdom in an organic, non-toxic garden. Personally, I use only CO2 on my indoor hydroponic plants, and never folar feed. It simply does not seem to be necessary when using hydroponics.

CO2

Elevating carbon dioxide levels can increase growth speed a great deal, perhaps even double it. It seems that the plant evolved in primordial times when natural CO2 levels were many times what they are today. The plant uses CO2 for photosynthesis to create sugars it uses to build plant tissues. Elevating the CO2 level will increase the plants ability to manufacture these sugars and plant growth rate is enhanced considerably. CO2 can be a pain to manufacture safely, cheaply, and/or conveniently, and is expensive to set up if you use a CO2 tank system. CO2 is most usable for flowering, as this is when the plant is most dense and has the hardest time circulating air around its leaves. If your strictly growing vegetatively indoors, (transferring your plants outdoors to flower), then CO2 will not be a major concern unless you have a sealed greenhouse, closet or bedroom, and wish to increase yield and decrease flowering time. For a medium sized indoor operation, one approach is to used CO2 canisters from wielding supply houses. This is expensive initially, but fairly inexpensive in the long run. These systems are good only if your area is not too big or too small. The basic CO2 tank system looks like this: 20 lb tank $100 Regulator $159 Timer or controller $10-125 Fill up $15-20 Worst case = $395 for CO2 tank setup synced to a exhaust fan with a thermostat. CO2 is cheaply produced by burning Natural Gas. However, heat and Carbon Monoxide must be vented to the outside air. CO2 can be obtained by buying or leasing cylinders from local welding supply houses. If asked, you can say you have an old mig welder at home and need to patch up the lawnmower (trailer, car, etc.) For a small closet, one tank could last 2 months, but it depends on how much is released, how often the room is vented, hours of light cycle, room leaks, enrichment levels and dispersion methods. This method may be overkill for your small closet. It is generally viewed as good to have a small constant flow of CO2 over the plants at all times the lights are on, dispersed directly over the plants during the time exhaust fans are off. Opportunities exist to conserve CO2, but this can cost money. When the light is off you don't need CO2, so during flowering, you will use half as much if you have the CO2 solenoid setup to your light timer. When the fan is on for venting, CO2 is shut off as well. This may be up to half the time the light is on, so this will affect the plants exposure times and amount of gas actually dispensed. Environmentally, using bottled gas is better, since manufacturing it adds to greenhouse effect, and bottled CO2 is captured as part of the manufacturing process of many materials, and then recycled. Fermenting, CO2 generators, and baking soda and vinegar methods all generate new CO2 and add to greenhouse effect. CO2 generation from fermentation and generators is possible. A simple CO2 generator would be a propane heater. This will work well, as long as the gases can be vented to the grow area, and a fan is used to keep the hot CO2 (that will rise) circulating and available below at the plants level. Fire and exhaust venting of the heat are issues as well. A room that must be vented 50% of the time to rid the environment of heat from a lamp and heater will not receive as

much CO2 as a room that can be kept unvented for hours at a time. However, CO2 generators are the only way to go for large operations.

Fermentation or vinegar over baking soda will work if you don't have many vent cycles, but if you have enough heat to make constant or regular venting necessary, these methods become impractical. Just pour the vinegar on baking soda and close the door, (you lose your CO2 as soon as the vent comes on). This method leaves a great deal to be desired, since it is not easy to regulate automatically, and requires daily attention. It is possible however, to create CO2 by fermentation, let the wine turn to vinegar, and pour this on baking soda. It's the most cost-effective setup for most closet growers, for whom $400 in CO2 equipment is a bit much to swallow. In fermentation, yeast is constantly killing itself; it takes a lot of space. You need a big bin to constantly keep adding water to, so that the alcohol levels will not rise high enough to kill the yeast. Sugar is used quickly this way, and a 10 pound sack will run $3.50 or so and last about 2-3 weeks. This is also difficult to gauge what is happening as far as amounts actually released. A tube out the top going into a jar of water will bubble and demonstrate the amount of CO2 being produced. Try sodium bicarbonate mixed with vinegar, 1 tsp: ~30cc- this will gush up all frothy as it releases CO2. do it just before you close the door on your plants. A MUCH cheaper way to provide CO2 is 2 Oz sugar in 2 liters of water in a bottle [sterilized 1st with bleach and water, then rinsed], plus a few cc urine[!] or if you insist, yeast nutrient from a home brewing supplier. Add a brewing yeast, shake up and keep at 25 deg celsius[~70 F] . Over next 2 weeks or so it will brew up about 1/2 Oz CO2 for every Oz sugar used. Keep a few going at once, starting a new one every 3 days or so. With added CO2 growth is phenomenal!!! I personally measured 38cm growth in 8 days under a 250watt HPS bulb[tubular clear, Horizontal mount. A good container is a 1 gallon plastic milk jug, with a pin-hole in the cap. Also, the air-lock from a piece of clear tube running into a jar filled with water will keep microbes out and demonstrate the fermentation is working. A variation is to spray seltzer water on the plants twice a day. This is not recommended by some authorities, and receives great raves by people who seem to feel it has enhanced their crop. It stands to reason this would work for only a small unvented closet, but may be right for some situations. It could get expensive with a lot of plants to spray. Use seltzer, not club soda, since it contains less sodium that could clog the plants stomata. Wash your plants with straight water after 2 or 3 seltzer sprays. It's a lot of work, and you can't automate it, but maybe that's good! Remember, being with the plants is a beautiful experience, and brings you closer to your spiritual self and the earth. Seltzer is available at most grocery stores (I get it at Lucky's @ .79 for a 2 litter bottle). Club soda will work if seltzer water is not available; but it has twice as much sodium in it. A very diluted solution of Miracle Grow can be sprayed on the plant at the same time. One factor of using selzter water is it raises humidity levels. Make sure your venting humidity during the dark cycle, or you could risk fungus and increased internode length. CAUTION: Don't spray too close to a hot bulb! Spray downward only, or turn off the lamp first. Even though CO2 enrichment can mean 30-100% yield increases, the hassle, expense, space, danger, and time involved can make constant or near constant venting a desirable alternative to enrichment. As long as the plant has the opportunity to take in new CO2 at all times, from air that is over 200 ppm CO2, the plants will have the required nutrients for photosynthesis. Most closets will need new CO2 coming in every two or three hours, minimum. Most citys' will have high concentrations of CO2 in the air, and some growers find CO2 injection unnecessary in these circumstances. Some growers have reported to High Times that high CO2 levels in the grow room near harvest time lower potency. It may be a good idea to turn off CO2 2 weeks before harvesting.

VENTING

You have to vent a lot with a HID lamp, less so for fluorescents. Also, humidity build up requires that you vent at least a few times per day. For a room with a hot lamp that builds up heat quickly, the best vent would be one that cleared the room in 5 minutes, then would stop for 25 minutes before venting again, or similarly, vent 3 minutes, shut off 12 minutes, etc. The trick is to find a timer that will do this sort of thing. Not easy to find and not cheap. Once you need to regulate CO2 on and off inversely with the fan, your looking at a $100 climate controller. Alternatives are a thermostat that turns on a fan when a certain temperature is reached, and turns it off when the temp recedes 4 degrees. But it is a bitch to coordinate CO2 release with this one, since you don't know when the fan goes on. $39 for this thermostat, but to sync it to CO2 with a voltage sensing relay is $100 for the ready-made switch, so then the environment controller at $100 is cheaper. All you really want is a fan that clears the air in a few minutes, a

temperature switch that turns on and off the fan, and an inverse switch that turns off and on the CO2. If you can vent the room really quick and the heat does not build up too quickly, the CO2 could be run in a slow, continuous fashion, and would build up in-between the occasional quick exhaust cycles. Two timers synced can be used, but the only ones cheaply available are the 30 min interval, 48 trips per 24 hours. So I could have a fan run 30 mins on, then 30 mins off. I could also sync it to the light so that I don't vent when the lamp is off. I can sync this to an identical timer that will turn on CO2 during the time that the fan is not on, and vise versa. It would be difficult to sync them closer that 5-10 mins, but at least there would be a possible inexpensive solution. $20 for two of these timers. Fans are expensive to buy for venting, but I just go down to the local electronic parts liquidators and they have muffin fans for $5-10, so that's a real savings over the $50-70 these fans cost new at the indoor garden stores. A good vent fan will keep the humidity and temperature down, and distribute CO2 to your plants from new incoming air. Internal air movement is very necessary as well. An oscillating fan should be used to circulate air within the growroom, to help circulate CO2. It will also keep the humidity down, allowing the air to absorb more moisture, and reduce risk of fungus. A wall mount oscillating fan will not take valuable floor space. The best grow rooms have the most internal air circulation.

TEMPERATURE

Proper temperature is one highly variable factor. Most books state optimum grow temperature to be 70-80 degrees, but many list extenuating circumstances that allow temperatures to go higher. Assuming genetics is not a factor, plants seem to be able to absorb more light at higher temps, perhaps up to 90 degrees. High light and CO2 levels could make this go as high as 95 degrees for increased growth speed.* An optimum of 95 degrees is new data that assumes very-high light, CO2 enrichment of 1500 ppm and good regular venting to keep humidity down. It is not clear if these temperature will reduce potency in flowers. It may be a good idea to reduce temperatures once flowering has started, to preserve potency, even if it does reduce growth speed. But higher temperatures will make plants grow vegetatively much faster, by exciting the plants metabolism, assuming the required levels of CO2 and light are available, and humidity is not allowed to get too high. With normal levels of CO2, in a well vented space, 90 degrees would seem to be the absolute max, while 85 may be closer to optimum, even with a great deal of light available. Do not let the room temperature get over 35 C (95 F) as this hurts growth. Optimal temperature is 27-30 C (80-86 F) if you have strong light with no CO2 enrichment. Less than 21 C (70 F) is too cold for good growth. Low temperatures at night are OK down to about 60 degrees outdoors, then start to effect the growth in a big way. Mid 50's will cause mild shock and 40's will kill your plants with repeated exposure. Keep your plants warm, especially the roots. Elevate pots if you think the ground is sucking the heat out of the roots. This is an issue if you have a slab or other type of cold floor. As temperature goes up, so does the ability of the air to hold water, thus reducing humidity, so a higher average temperature should reduce risk of fungus. Contrary to many reports, high humidity is not good for plants except during germination and rooting. Lower humidity levels help the plant transpire CO2 and reduce risk of molds during flowering. Studies indicate the potency of buds goes down as the temperature goes up, so it is important to see that the plants do not get too hot during flowering cycles.

PESTS

You really have to watch pests, or all your efforts could result in little or nothing in return. Mites and Aphids are the worst; whiteflies, caterpillar and fungi are the ones to watch out for long term. Pyrethrum bombs can start you with a clean slate in the room, and then homemade or commercial soap sprays will do most of the rest. When bringing in plants from outside, pyrethrum every broad leaf top and bottom and the soil too. Then watch them closely for a week or two, and soap down any remaining bug life you find from eggs being hatched. This should do the trick for a month or two, long enough it won't be an issue before harvesting. Fungus is another obstacle in the path of a successful growing season. When the flowers are roughly half developed they become susceptible to a fungus or bud rot. It appears that growing conditions for the fungus are best when temperatures are between 60 and 80 degrees and the humidity is high. The fungus is very destructive and spreads quickly. It is a spore type of fungus that travels to other buds via the wind so it is impossible to prevent or stop if weather conditions permit it to grow. If things should go badly and the fungus starts to attack your plants, you must remove it immediately or it will spread to other areas of the plant or plants. Some growers will remove just the

section of the bud that is infected whereas other growers will remove the entire branch. Removal of the entire branch better insures that the fungus is totally re- moved, and also enables the grower to sample the crop a few weeks ahead of time. Fungi can wipe your crop quick, so invest in some SAFE fungicide and spray down the plants just before flowering if you think fungus may be a problem. Don't spray the plants if you have never had problems with fungus before. Keep humidity down, circulate air like crazy in the grow space and keep unquarantined outdoor plants out of the indoor space. Don`t wait until after flowering, since it's not a good idea to apply the fungicide directly to flowers. Instead, flowers must be cut off when they are infected. Most fungicides are very nasty, and you won't want to ingest them, so it is necessary to use one that is safe for vegetables. Safer makes a suitable product that is available at most nurseries; it contains only sulfer in solution. Use soap solution like Safer Insecticidal Soap to get rid of most aphid problems. Use some tobacco juice and chili pepper powder added to this for mites. Dr. Bronnars Soap can be used with some dish detergent in a spray bottle if you want to save money. Pyrethrum should only be used in extream circumstances directly on plants, but can be used in a closet or greenhouse in the corners to get rid of spiders and such. It breaks down within a week to non-toxic elements, and can be washed from a plant with detergent solutions and then clear water. I find Pyrethrum to be the best solution for spider mites, if it is sprayed on young plants up to early flowering. Into later flowering, the tobacco and pepper/soap solution is your best bet, on a daily basis, on the under-sides of all infected leaves. Spider mites are by far the worst offender in my garden. I have finally learned not to bring plants from outside into the indoor space. They are always infected with pests and threaten to infect the entire indoor grow space. It is much more practical to work WITH the seasons and regenerate plants outdoors in the Summer, rather than bringing them indoors to regenerate under constant light. Start a plant indoors, take it outside in Spring to flower. Take a harvest or two, feed it nitrogen all Summer and it will regenerate naturally, to be flowered again in the Fall. Once a plant has been taken outside, leave it outside.

TRANSPLANTING

There will be little or no shock if you are quick and tender in your handling of the plants. Make sure you only need to transplant twice, or better yet, once if possible, through the entire growth cycle. Transplanting slows you down. It takes time, it's tricky, it's hard work, and threatens the plants. Start in as large a container as possible, square is best. 16 ounce plastic cups work OK, and 2 litter soda bottles cut down may be big enough for the first harvest when growing hydroponically. One-gallon plastic milk or water containers (squarish) will work too. Or start seeds and rooted cuttings in 16oz plastic cups. It's better to have less seedlings than it is to have many seedlings that need constant transplanting. These larger cups take only a little more space, and allow you to transplant only one time before harvesting the first crop. Transplant into a gallon water jugs (cut down to 3/4 gallon) before forcing flower growth. To regenerate this plant after harvesting, transplant it into a larger pot after it goes into vegetative growth once again, 5 gallon paint buckets work pretty well if you can spare the space, and a 2-3 gallon container would make this plant's 2nd harvest better than the first, given enough vegetative regrowth first. One more tip: A Russian study showed that seedlings with at least 4" of soil to grow the tap root were more likely to go female. The source I'm quoting says "This may be why some farmers get female/male ratios as great as 80%/20%."

EARLY SEXING

It's possible to tell the sex of a plant early, and thus move male plants out of the main growing area sooner by covering a plant's lower branch for 12 hours a day while it's in a constant light vegetative state. Use a black paper bag or equivalent to allow for air flow while keeping out light. Be sure to set up a regular cycle for these covered branches. If light is allowed to reach them during the dark period, they may not indicate early at all. Use a magnifying glass to look at the early flowers sex type. A male plant will have a small club (playing card) looking preflower with a small stem under it. A female flower is usually a single or double pistil, white and wispy, emerging from an immature calyx. Some people like to pre-force plants when they are 8" tall, in order to weed out the males. When growing outdoors, many growers do not wish to devote time, space or energy to male plants. Just put the plants on a 12 hours light cycle for 2 weeks, separate the females from the males, then revert the light cycle back to 18-24 hours to continue vegatative growth for the females. Keep in mind, this is a time consuming process and can put the plants

back 2 weeks in growth. Don't pre-force plants unless you have lots of time. Just cover one branch per plant with black paper (light tight, breaths air) 12 hours every day under constant light to force pre-flowers and differentiate early.

REGENERATION

It is possible to harvest plants and then rejuvenate them vegetatively for a 2nd and even 3rd harvest. A second harvest can be realized in as little as 6-8 weeks. Since the plant's stalk, and roots are already formed, the plant can produce a second, even third harvest of buds in a little more than half the time of the original harvest. When harvesting, take off the top 1/3rd of the plant. Leave most healthy fan leaves in the middle of the plant, cutting buds off branches carefully. On the lower 1/3rd of the plant, take off end flowers, but leave several small flowers on each branch. These will be the part of the plant that is regenerated. The more buds you leave on the plant, the faster it will regenerate. Feed the plant some Miracle Grow or any high nitrogen plant food immediately after harvest. When you intend to regenerate a plant, make sure it never gets too starved for nitrogen as it is maturing, or all the sun leaves will fall off, and your plant will not have enough leaves to live after being harvested. Harvested plants can come inside for rejuvenation under continuous light or are left outside in Summer to rejuvenate in the natural long days. It will take 7-14 days to see signs of new growth when regenerating a plant. As stated before, and in contrast to normal growth patterns, lower branches will be the first to sprout new vegetative growth. Allow the plant to grow a little vegetatively, then take outside again to reflower. Or keep inside for vegetative cuttings. You now have two or three generations of plants growing, and will need more space outside. But you will now be harvesting twice as often. As often as every 30 days, since you have new clones or seedlings growing, vegetative plants ready to flower, and regenerated plants flowering too. Regenerating indoors can create problems if your plants are infected with pests. It may be best to have a separate area indoors that will not allow your plants to infect the main indoor area. An alternative to regenerating indoors is to regenerate outdoors in the Summer. Just take a harvest in June, then allow the plant to regenerate by leaving some lower buds on the plant, and leaving the middle 1/3rd of the plant's leaves at harvest. Feed it nitrogen, and make sure it gets lots of sun. It will regenerate all Summer and be quite large by Fall, when it will start to flower again naturally.

PRUNING

Plants that are regenerated, cloned and even grown from seed will need to be pruned at some point to encourage the plant to produce as much as possible and remain healthy. Pruning the lower limbs creates more air-flow under the plants in an indoor situation and creates cuttings for cloning. It also forces the plant's effort to the top limbs that get the most light, maximizing yields. Plants that are regenerated need to have minor growth clipped so that the main regenerated growth will get all the plant's energy. This means that once the plant has started to regenerate lots of growth, the lower limbs that will be shaded or are not robust should go. The growth must be thinned on top branches such that only the most robust growth is allowed to remain. Once nice aspect of regenerating plants is that some small buds left on the plant in anticipation of regeneration will not sprout new growth and may be collected for smoke. The plant may provide much smokable material if it is caught before all the old flowers dry up and die with the new vegatative growth occuring. Try to trim a regenerated plant twice. Once as it is starting to regenerate, collect any bud that is not sprouting with new growth and smoke it. Then later, prune again to take lower clippings to clone and thin the upper growth so that larger buds will be produced. If a regenerated plant is not pruned at all, the resulting plant is very stemmy, does not create large buds and the total yield will be significantly reduced.

HARVESTING AND DRYING

Harvesting is the reaping of the bounty, and is the most enjoyable time you will spend with your garden. Plants are harvested when the flowers are ripe. Generally, ripeness is defined as when the white pistils start to turn brown, orange, etc. and start to withdraw back into the false seed pod. The seed pods swell with resins usually reserved for seed production, and we have ripe sinse buds with red and golden hairs. It is interesting that the time of harvest controls the "high" of the buds. If harvested "early" with only a few of the pistils turned color, the buds will have a more pure THC content and will have less THC that has

turned to CBD and CBN's. The lessor psychoactive substances will create the bouquet of the pot, and control the amount of stoneyness and stupidness associated with the high. A pure THC content is very cerebral, while high THC, high CBD, CBN content will make the plants more of a stupid, or hazy buzz. Buds taken later, when fully ripened will normally have these higher CBN, CBD levels and may not be what you prefer once you try different samples picked at different times. Don't listen to the experts, decide yourself based on what you come to like yourself. Keep in mind, a bud weighs more when fully ripe. It is what most growers like to sell, but take some buds early for yourself, every week until you harvest, and decide how you like it for yourself. Grow the rest to full maturity if you plan to sell it. Most new growers want to pick early, because they are impatient. That's OK! Just take buds from the middle of the plant or the top. Allow the rest to keep maturing. Often, the tops of the plants will be ripe first. Harvest them and let the rest of the plant continue to ripen. You will notice the lower buds getting bigger and fuzzier as they come into full maturity. With more light available to the bottom portion of the plant now, the plant yields more this way over time, than taking a single harvest. Use a magnifier and try to see the capitated stalked trichomes (little THC crystals on the buds). If they are mostly clear, not brown, the peak of floral bouquet is near. Once they are mostly all turning brownish in color, the THC levels are dropping and the flower is past optimum potency, declining with light and wind exposure rapidly. Don't harvest too late! It's easy to be too careful and harvest late enough potency has declined. Watch the plants and learn to spot peak floral potency. Do not cure pot in the sun, it reduces potency. Slow cure hanging buds upside down in a ventilated space. That is all that is needed to have great sensi. Drying in a paper bag works too, and may be much more convenient. Bud tastes great when slow dried over the course of a week or two. If your in a hurry, it's OK to dry a small amount in-between paper sheets or a paper bag in a microwave oven. Go slow and check it, don't burn it. Use the defrost power setting for a slower, better drying. It will be harsh smoking this way though. A food dehydrator or food preserver will dry your pot in a few hours, but it will not taste the same as slow-dried. Very close though. And this will speed your harvest time (which can be nerve-wracking, with all this pot hanging around drying.) Dry buds until the stems are brittle enough to snap, then cure them in a sealed tupperware container , burping air and turning the buds daily for two weeks. Once experienced grower told me to dry in an uninsulated area of the house (like the garage) so that the temperature will rise and fall each night, as the plant is drying. If you treat the plant as if it were still alive, it will use some of it's chlorophyll while it is drying, and the smoke will be less harsh.

CLONING

Cloning is asexual reproduction. Cuttings are taken from a mother plant in vegatative growth, and rooted in hydroponic medium to be grown as a separate plant. The offspring will be plants that are identical to the parent plant. Cloning preserves the character of your favorite plant. Cloning can make an ocean of green out of a single plant, so it is a powerful tool for growing large crops, and will fill a closet quickly with your favorite genetics. When you find the plant you want to be your "buddy" for the rest of your life, you can keep that plant's genetic character alive for decades and pass it on to your children's children. Propagate and share it with others, to keep a copy, should your own line die out. A clone can be taken from a clone at least 20 times, and probably more, so don't worry about myths of reduced vigor. Many reports indicate it's not a problem. Cloning will open you to the risk of a fungus or pests wiping out the whole crop, so it's important to pick plants that exhibit great resistance to fungus and pests. Pick the plant you feel will be the most reliable to reproduce in large scale, based on health, growth rate, resistance to pests, and potency. The quality of the high, and the type of buzz you get will be a very important determining factor. Take cuttings for clones before you move plants from vegetative grow area to the flowering area. Low branches are cut to increase air circulation under the green canopy. Rooted clones are moved to the vegetative growth area, and new clones are started in the cloning area using the low branch cuttings. Each cycle of growth will take from 4-8 weeks, so you can constantly be growing in 3 stages, and harvesting every 6-8 weeks. Some types of plants are more difficult to clone than others. Big Bud is reported to not clone very well. One of my favorite plants, Mr. Kona, is the most amazing pot I ever smoked, but it is hard as hell to clone. What a challenge! I noticed other varieties that were rooting much quicker, but it was the stone I was after! Once you find the psychoactive, almost hallucinogenic properties of some Indica/Sativa hybrids, you never want to smoke a pure Indica again. Indica is however, great medicinally, so I like to grow a few pure strains too. If a plant is harvested, you can sample it, and decide if you want to clone it. Pick your favorite 2 or 3 distinctly different types of plants to clone, based on trying the harvested plants. The plants you want to clone can be regenerated by putting them in constant light.

In a few weeks, you will have many vegetative cuttings available for cloning and preserving your favorite plants. Always keep a mother plant in vegatative mode for any strain you want to keep alive. If you flower all your clones, you may end up killing off a strain if you don't have any plant devoted to being a mother. I killed off a sacred strain accidentally this way; my harvested plants failed to regenerate and the strain would have died completely had not previously igven it to friends to grow it as well. I was in luck, and a buddy set me up with another clone of this strain to grow as a mother plant for a new crop of clones. After two months, any marijuana plant can be cloned. Flowering plants can be cloned, but the procedure may take considerably longer. Its best to wait, and regenerate vegetatively plants that have been harvested. A single regenerated/harvested plant can generate hundreds of cuttings. Before taking cuttings, starve the plant for nitrogen for a week at least, so that the plant is not extreamly green, as this will make rooting take longer. Take cuttings from the bottom 1/3 of the plant, when doing ordinary pruning. Cut young growth tips from a vegetative stage, mature plant 3-5 inches long with a stem diameter 1/5-1/10 inch. Cut with a sterile razor blade or X-acto knife (flamed) and immerse the cut end of the clone into a tub of distilled water mixed with 1/4 tspn Peters 5-50-17 per gallon. Next, cut the bottom .2 inch off the end while it is submerged, using a diagonal cut. Remove the clone from the tub and dip into a liquid cloning solution following instructions on the label. Dust with RootToneF and place in cloning tray or medium. Flowering plants can be cloned too, but may take longer, and may not have as high a success rate.

Cloning goes quickest with the liquid rooting solutions, in a warmed, aerated tray, with subdued lighting and high humidity. Placing cuttings into 1" rockwool cubes in a covered tray works great too. In a closet, you can make space above the grow area so that the heat of the lamp warms the tray (passive collecting) and spare the expense and hassle of the aquarium heater ($24) or agricultural heating pad w/ thermostat (pricey). A double 4" fluorescent lamp will be perfect. Leave lamps on for 24 hours a day. Cuttings should root in 2-3 weeks. I found only one liquid rooting hormone solution that was not over $10. (Olivia's Gel was $12 for a 1.6 ounce bottle. Geez, what is this stuff, gold?) I found some dipNgrow for $9, considered myself lucky, and got a tray and clear cover for $7. A clear tray cover or greenhouse encloser is needed to bring up humidity to 90% (greenhouse levels). Liquid rooting hormone seems to be much more effective than powders. Some types available are Olivia's, Woods, and dipNgrow. Mix a weak cloning solution of high P plant food (such as Peter's 5-50-17), trace elements, and epsom salts and then dip plants in rooting solution per instructions on label. All of the above nutrients should be added in extremely small amounts, 25% of what would normally be used on growing plants. Or use a premade solution such as Olivia's Rooting Solution. Corn syrup has been reported to supplement the sugars needed by the plant during cloning, since it consists of plant sugars. Use a powder fungicide too, like RoottoneF to be sure you don't spoil the clones with fungus. This is important, since clones and fungus like the conditions you will be creating for good rooting: mild light, 72-80 degrees, high humidity In rockwool, there is no need for airating the solution, just keep the cubes in 1/4" of solution so they wick and stay moist at all times. Try to keep clones evenly spaced, and spray them with water once a day to keep them moist and fresh. Pull out clones if they are diseased and dying, to keep them away from healthy starts. Another method is to float cutings in a tray full of solution on polystyrene disposable plates, or styrene sheets (shipping/packing material) with holes punched, so the tops and leaves are out of the water. Take off all large leaves, leaving only smaller top leaves to reduce demand on the new rooting stalk. Aerate the tray solution with an air pump and bubble stone. Keep solution at 72-80 degrees for best results. Change the solution daily if not using an air stone and pump, so that oxygen is always available to the cuttings. A week later, clip yellowing leaves from cuttings to reduce water demands as the cuttings start to root. Buy a tray with a clear cover made for rooting at an indoor gardening supply house. You must keep humidity very high for the clones. Put cuttings in an ice chest with cellophane over the top and a light shining down if you don't want to pay for the grow tray and cover. It's also possible to directly place a dipped cutting in a moist block of floral foam with holes punched, or vermiculite in a cup; be sure to root cuttings in a constantly moist medium. Jiffy peat cubes are not recommended, as published reports indicate results were not good for rooting clones. Place starter cubes in tray of solution. Check twice a day to be sure cubes are moist, not drenched, and not dry. After about 2-3 weeks, rootlets will appear at the bottom of the pods. Transplant at this point to growing area, taking care not to disturb any exposed roots.

One grower writes virtually all attempted clones root by:

0. Prep cutting by removing large leaves on tip to be cut, allow to heal.

1. While holding underwater, take final diagonal cut on stem to be rooted.
2. Dip in Rootone, then spear stem about 2" deep in 16 oz. cups of 1/2 vermiculite, 1/2 perlite, which are kept in a stryrofoam cooler. 3. Spray cuttings with a VERY mild complete fert. soln.
4. Cover top of cooler with Saran Wrap, then punch holes for ventilation.
5. Keep cooler in relatively mild temps, low light, and spray cuttings daily.
6. Cuttings should root in about 3 weeks. Cloning is not as easy as starting from seed. With seeds, you can have 18" tall plants in 6 weeks or less. With clones, it may take 6 weeks for the plant to sprout roots and new growth. Seeds are easily twice as fast if you have empty indoor space being wasted that needs to be put to use quickly. Always breed a few buds for seeds, even if you expect to be cloning most of the time, you could get wiped out, and have nothing but your seeds left to start over. Cloning in rockwool seems to work great, and no airpump is needed. I paid $9 for 98 rockwool starter cubes. A plastic tray is available ($.95) that holds 77 cubes in pockets allowing the cubes to be held in a tray of nutrient solution. They are easily removed and placed in a larger rockwool growing cube when rooted.

BREEDING

It is possible to breed and select cuttings from plants that grow, flower, and mature faster. Some plants will naturally be better than others in this regard, and it is easy to select not only the most potent plants to clone or breed, but the fastest growing/flowering plants as well. Find your fastest growth plant, and breed it with your "best high" male for fast flowering, potent strains. Clone your fastest, best high plant for the quickest monocrop garden possible. Over time, it will save you a lot of waiting around for your plants to mature. When a male is starting to flower (2-4 weeks before the females) it should be removed from the females so it does not pollinate them. It is taken to a separate area. Any place that gets just a few hours of light per day will be adequate, including close to a window in a separate room in the house. Put newspaper or glass under it to catch the pollen as the flowers drop it. Keep a male alive indefinitely by bending it's top severely and putting it in mild shock that delays it's maturity. Or take the tops as they mature and put the branches in water, over a piece of plate glass. Shake the branches every morning to release pollen onto the glass and then scrap it with a razor blade to collect it. A male pruned in this fashion stays alive indefinately and will continue to produce flowers if it gets suitable dark periods. This is much better than putting pollen in the freezer! Fresh pollen is always best. Save pollen in an air tight bag in the freezer. It will be good for about a month. It may be several more weeks before the females are ready to pollinate. Put a paper towel in the bag with it to act as a desecant. A plant is ready to pollinate 2 weeks after the clusters of female flowers first appear. If you pollinate too early, it may not work. Wait until the female flowers are well established, but still all while hairs are showing. Turn off all fans. Use a paper bag to pollinate a branch of a female plant. Use different pollen from two males on separate branches. Wrap the bag around the branch and seal it at the opening to the branch. Shake the branch vigorously. Wet the paper bag after a few minutes with a sprayer and then carefully remove it. Large plastic zip-lock bags also. Slip the bag over the male branch and shake the pollen loose. Carefully remove the bad and zip it up. It should be very dusty with pollen. To pollinate, place it over a single branch of the female, zipping it up sideways around the stem so no pollen leaks out. Shake the bag and the stem at the same time. Allow to settle for an hour or two and shake it again. Remove it a few hours later. Your branch is now well pollinated and should show signs of visible seed production in 2 weeks, with ripe seeds splitting the calyxes by 3-6 weeks. One pollinated branch can create hundreds of seeds, so it should not be necessary to pollinate more than one or two branches in many cases.

When crossing two different varieties, a third variety of plant will be created. If you know what characteristics your looking for in a new strain, you will need several plants to choose from in order to have the best chance of finding all the qualities desired. Sometimes, if the two plants bred had dominant genes for certain characteristics, it will be impossible to get the plant you want from one single cross. In this case, it is necessary to interbreed two plants from the same batch of resultant seeds from the initial cross. In this fashion, recesive genes will become available, and the plant character you desire may only be possible in this manner. Usually, it is desirable only to cross two strains that are very different. In this manner, one usually arrives at what is refered to as "hybrid vigor". In other words, often the best strains are created by taking two very different strains and mating them. Less robust plants may be the result of interbreeding, since it opens up recesive gene traits that may lead to reduced potency. Hybrid offspring will all be very different from each other. Each plant grown from the same batch of seeds collected from

the same plant, will be different. It is then necessary to try each plant separately and decide it's individual merits for yourself. If you find one that seems to be head and shoulders above the rest in terms of early flowering, high yield and get buzz, that's the plant to clone and continue breeding. In depth genetics is beyond the scope of this work. See Marijuana Botany; Smith, for more detailed info in this area.

SINSEMILLIA

When the female plant is not allowed to pollinate, it grows full of resin that was intended to make seeds. False seed pods swell with THC laden resin and the pistils turn red and orange and withdraw into the pods. Then the plant is harvested. Seeds are not part of the bud when the flowers mature. This is called Sinsemillia, and simply means "no seeds".

SINSE SEEDS

It is possible to cross your favorite two female plants to create a new strain of seeds that will produce all female plants. Preferably, these two plants will be different types of plants, not from the same mother's seeds. This will create the best offspring, since it will not lead to inbreeding. It is easier to gauge the quality of female plants than male plants, since the smoke is more potent and easier to judge it's finer qualities. Plants from seeds created in this fashion will be all female plants since there will be no chance of male chromosomes from female parents. Use Gibberellic Acid on one branch of a female plant to induce male flowers. Gibberellic Acid is sold by nursery supply houses for plant breeding and hybridizing. Spray the plant once every day for 10 days with 100 ppm gibberellic acid. When the male flowers form, pollinate the flowers of your other target female plant you have selected. Just pollinate one branch unless you want lots of seeds! Once the branch has male flowers, cut the branch and root it in water, with glass under it to catch the male pollen when it drops. Use a rooting solution similar to the above cloning solution.Collect the pollen with a plastic bag over the branch and shake it. Use a razor blade to scrap up fallen pollen and add it to the bag too. It is also possible to pollinate the flowers of the plant you create the male flowers on, crossing it with itself. This is used to preserve a special plants characteristics. Cloning will also preserve the plants characteristics, but will not allow you to store seeds for use later. Crossing a plant with itself can lead to inbreeding problems, so it may not be the optimum solution in many cases. I once tried using Gibberellic Acid, sprayed on a healthy female, every day for over a week. No male flowers appeared on the plant. Your milage may vary.

ODORS AND NEGATIVE IONS

Negative ion generators have been used for years now to cut down on odors in a grow room, but reports are coming in that a negative ion generator will increase growth speed and yield. No true evidence to support this, however it does make sense, due to the fact that people and animals seem to be altered in a positive way by negative ions in the air, so plants may "feel" better too. Try putting one in the grow room. You may notice the buds don't have as much scent when picked, but that may be desirable in some cases. A negative ion generator can be purchased for $15 to $100 depending on the type and power involved. Some have reversed cycles that collect the dust to a charged plate. It is also possible to use grounded aluminum foil on the wall and shelf where the ionizer sits, to collect these particles. Just wipe the foil clean once a month. It should be grounded to an electrical outlets ground wire. If you don't cover the wall and shelf with paper or foil, the wall will turn dark with dust taken from the air, and you will have to repaint that wall later.

OXYGEN

O2 to the roots is a big concern, since the plant requires this for nutrients to be available, and to rid itself of toxins, etc. One of the easiest things to do is use food grade hydrogen peroxide in the water to increase the availability of oxygen in the water. H2O2 has an extra oxygen atom that will easily break away and can be used by the plant. Oxygen Plus is a plant food that contains 25% hydrogen peroxide and is perfect for this use. Using a planting medium that allows for plenty of aeration is also really important. Be sure you have good drainage by using Perlite, sand, or gravel in your mix and at the bottom of pots. Don't use a medium that holds too much water, or you may significantly reduce the oxygen

available to the plant. More on that in the section on hydroponics. Aerating the water before watering is also a good idea. In the case of soil potted plants, use an airpump to aerate the water overnight before watering your plants, or put the water in a container with a cap and shake it up real good before giving to the plants.

SAFETY AND PRIVACY

Utility companies can tell your bill is way off from the same time last year, and police are finding growers this way. More than 500 watts in the family home running constantly will show up as a regular monthly increase in electricity use. You can claim space heaters, more people living on the premises, too many television sets, and late hours, if they happen mention it to you (innocently). If the police knock and ask you about it, don't let them in, and move your plants to another location during the wee hours in a vehicle not your own. Upon moving into a new place, it may be desirable to immediately establish high electricity use, so that your electrical use history won't reveal your activities in the future... Light leaks, open windows, heat expelled from rooms that would normally be cool, and rip-offs are all serious issues to be concerned about. Don't use a burglar alarm on when your away from the house. People are busted this way when the kids try to rip off the garden and the police come. Lock the house up well, and let them take it if they need it so bad. It's not worth getting busted for a burglary... Think ahead to any situation that will require outsiders to visit sensitive areas of the house. Repairmen, solicitors, meter readers, neighbors, appraisers, and pets should all be considered and contingency plans made in advance.

DISTILLED WATER

Some growers report purified or distilled water helps their plants grow faster. Perhaps due to sodium and heavy metals found in hard water that are not present in purified water. Hard water tends to build up alkaline salt deposits in soil that lockup trace minerals, and cause iron, copper and zinc deficiencies. There are several types of purified water, but many are not free of minerals that could be causing salt buildup over an extended period of time. Tap water comes in two flavors. Hot and cold. The cold pipe has less calcium and sodium buildup in it, and should be freer of sediment once the water has been turned on and allowed to flow for 30 seconds. Hot water will have rust, lead deposits, and lots of sodium and calcium, so much so, you will see it easily. Use only the amount of hot water needed to make the water the correct temperature (70-80 F). Tap water filtered through a carbon (charcoal) filter will be free of chlorine and most large particles, but will still contain dissolved solids such as sodium and heavy metals (lead, arsenic, nickel, etc.). Purified bottled water will be either Reverse Osmosis or some form of carbon/sediment filtered water. When purchasing water at a store, unless it says RO or Distilled, don't bother buying it. It could still have the same dissolved solids and heavy metals your tap water has.

BIRTH CONTROL PILLS

A solution of one pill to one gallon of water has been reported to cause increased growth speed in tomato plants. It is possible this will help herb plants too. One treatment administered before flowering and one administered a few weeks before harvesting might help the plant mature faster. One grower told a story of the same type of plants, one administered the estrogen grew to 20 feet, while the other was 7 feet. This may be purely anecdotal, but it may work. Try it and report back to us on results.

SEED AND BUD STORAGE

Use a seal-a-meal to hermetically seal the bag with no air inside. Freeze or refrigerate, and bud and seed can be kept for years this way. Rap seeds in a paper towel to absorb moisture. Keep them in the freezer, and pull out only as many seeds as you need, then pop them back in the freezer quickly.

A FINAL COMMENT

Good results can be had even in what appear to be rather marginal situations. (i. e.: a four inch pot in a room with a skylight.) With the minimum of: well drained medium, good light with ventilation, regular application of a complete fertilizer, pest control, and avoidance of detection, anyone can take a viable

seed to maturity. One need not have a lot of money, or even know-how to grow good plants.